



Newest Scientific Discoveries and Remarkable Facts



ROMANCE of the LOCOMOTIVE TOLD on the CENTENNIAL of Its BIRTH

426-Ton Engine Evolved From 4-TON Start a Century Ago

A CENTENNIAL that passed almost unobserved in 1915 was that of the locomotive, probably the greatest factor in the marvelous development of the world in the past century. It was just a hundred years ago, late in 1815, that George Stephenson completed the first engine to be operated on a railroad by direct transmission of power. Railroads there had been for years, but only strips of iron along which horses pulled wagons, generally in the quarries of England.

Stephenson, an ignorant young miner, rose to be a master mechanic and then an engineer. His first locomotive, called the "Blucher," was a crude and primitive affair, operated by means of spur wheels. His second attempt, "Billy No. 1," was finished in 1815 and was the forerunner of the giant Moguls and Mikados of today. In it the power was transmitted directly to the driving wheels by means of connecting rods and cranks. From that date on the development of the locomotive was rapid, but it was not until the introduction of coal as fuel in the '70s that the modern types were evolved.

Stephenson's "Billy No. 1," now known as the Killingworth engine from the colliery in which it was operated, was followed by others in steady procession, all built by Stephenson and his son, Robert, who acquired fame and wealth as locomotive constructors. In 1829 the "Rocket" attained a speed of twenty-nine miles an hour. A few years before the first steam railway had been opened between Stockton and Darlington, and soon the Manchester and Liverpool railway was an accomplished fact. From that time on the growth of the railroad in England was steady if not rapid.

But it is in America that the greatest strides have been made the past century and the history of the locomotive is in part the history of the development of this great country from coast to coast. It is a far cry from Stephenson's "Billy No. 1," weighing four tons, hauling ten wagons and only nine feet long, to the Erie railroad's monster "Matt. H. Shay," the 165-foot "centipede" weighing 426 tons, which can haul 640 freight cars—a train nearly five miles in length and weighing 90,000,000 pounds.

The first locomotive came to America in 1829 and was called the "Stourbridge Lion." It did little more than demonstrate the possibilities of steam-driven engines. Americans were to develop the great industry which made possible the exploitation of a continent. In 1827 a crude railway had been opened between Boston and Quincy for the transportation of granite for the Bunker Hill monument. Horse power was used. In August, 1829, the Carbondale railroad was opened by the Delaware & Hudson Canal Company and extended from Honesdale, Pa., to Carbondale, a distance of sixteen miles. It was the first road on which a locomotive was used in this country, and the engine used was the "Stourbridge Lion."

In May, 1830, the first division of the Baltimore & Ohio railroad, extending from Baltimore to Ellicott's Mills, a distance of fifteen miles, was formally opened, but the passenger service was not inaugurated till July 5 of the same year, owing to scarcity of cars. Horse power was employed till the road was completed to Frederick in 1832.

Peter Cooper designed the first locomotive to be built in America. It was a diminutive machine, weighing about a ton, named the "Tom Thumb," and it was run once or twice only in 1830 on the Baltimore & Ohio railroad, then under construction.

Soon afterwards the West Point Foundry in New York completed the "Best Friend of Charleston," which was the earliest American-built locomotive to carry passengers in actual service. Put in service on a line running into Charleston January 15, 1831, it did service for many years. The third American-built locomotive was the "De Witt Clinton," designed and constructed at the West Point Foundry Works. Its first run was made August 29, 1831, on the Mohawk & Hudson railroad. This locomotive attained the speed of forty miles an hour.

The earliest locomotive in the world to be equipped with bell, headlight and



THE MATT H. SHAY

cowcatcher, was the "John Bull," built by George and Robert Stephenson in 1825.

"Old Ironsides" was the first engine constructed by Matthias W. Baldwin, who founded the Baldwin works. It was a four-wheeled model and weighed about five tons. It was built for the Philadelphia, Germantown & Morristown railroad in 1832, at a cost of \$2,500. Some of the great freight engines of today cost over \$30,000 and some of the passenger engines of 1915 cost over \$20,000.

With the introduction of coal as a fuel in the '70s, the giant locomotives of today became a possibility. The "Matt H. Shay" is the largest ever built, although the Erie is building three more of the same type. This huge "pusher" has three pairs of cylinders, each driving four pairs of wheels.

DICTATES to Typewriter

THE complete elimination of the stenographer is the aim of a Brooklyn inventor who is at work attempting to perfect an apparatus by means of which the voice, speaking into a telephone transmitter, will operate a typewriter.

He uses a system of steel reeds, which correspond, in their operation, to the fibers of the internal ear and a number of electro-magnets. A sound spoken into the transmitter sets the diaphragm vibrating. Each letter of the alphabet sound possesses an individual overtone, and this affects the steel reed attuned to it, causing the reed to vibrate sufficiently to close an electric circuit.

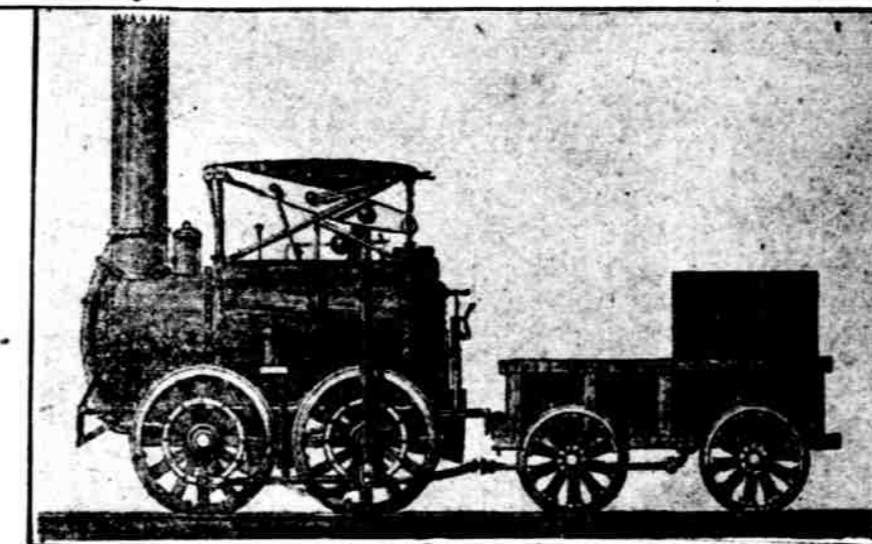
As soon as the circuit is closed, a magnet moves the key of the letter spoken. The apparatus is said to record perfectly all the vowels when spoken distinctly into the transmitter, but it has trouble with some of the consonants, which is attributed to the lack of sensitivity in the steel reeds.

Water SPOILED Easily By IRON

HALF a part per million of iron in water is detectable by taste, and more than four or five parts makes water unpalatable. In some mineral springs iron is the constituent which imparts a medicinal value to the water, but ordinarily it is undesirable.

More than 2.5 parts per million in water used for laundering makes a stain on the clothes. Iron must be removed from water from which ice is made, or a cloudy, discolored product will result. An iron content of over two of three parts per million in water used in the manufacture of paper will stain the paper.

Iron is harmful in water used for steaming, for it is in equilibrium with acids which inside the boiler become disassociated, with the result that the free acids corrode the boiler plates; but the amount of iron carried in solution by most waters is so small that the damage it does to steam boilers generally amounts to little.



THE STOURBRIDGE LION, FIRST LOCOMOTIVE TO TURN A WHEEL ON AN AMERICAN RAILROAD—"BILLY NO. 1," THE FIRST PRACTICAL LOCOMOTIVE, BUILT IN 1815.

DISH Towels and NAPKINS Are in Disrepute

NOW the dish towel is in disrepute. Medical men have begun a campaign against unclean kitchen towels and the over-used napkins in the hands or at the belts of waiters and waitresses. Sterilization is the cry.

One of the crusaders, writing in the Journal of Home Economics, says that the fate of the dish towel, even of the genteel barred variety, called a tea towel, has been sealed "ever since man began to look through the microscope and think in terms of the microscope."

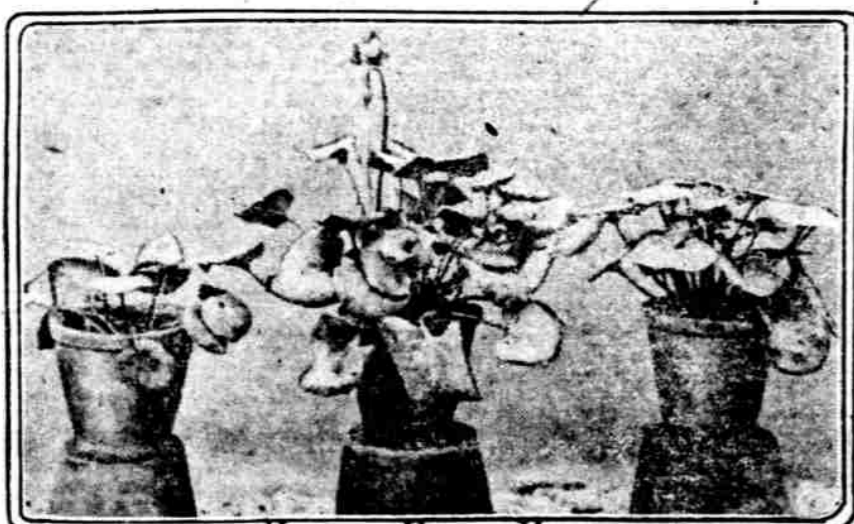
"Only when freshly washed and boiled and used in clean hands to wipe the rims of scalded and drained dishes is it to be admitted into a modern kitchen. Used in dirty hands—ill grimy, carried on the arm of a waiter and used to polish a plate or wipe up a table, it belongs to the dark ages, hygienically speaking. In dish washing the household should more and more approach the practice of the laboratory, where glassware and porcelain are washed, rinsed in boiling water and placed to drain. No cloth, no matter how well known its antecedents, is allowed to touch them, for they are now absolutely clean and must remain clean."

Perhaps, if such ideas as these are becoming current, we may hope for the day when Bridget will invariably sterilize her dish cloth and scorn the dish towel for her aseptic dishes, while "neat-handed Phillips" will always complete her toilette beyond all revision before coming to serve our food.

Not a single serious case of typhoid fever has occurred in the forces of the geological survey since the field men three years ago took advantage of the offer of the war department to supply antityphoid serum.

The 658 gold, silver, copper, lead and zinc mines of California yielded \$25,710,645 in 1914. In Oregon, 105 producing mines yielded \$1,676,153 worth of the same metals.

Humogen---Plants Are Made to Thrive on Bacteria



1. CYCLAMEN GROWN IN ORDINARY SOIL. 2. GROWN WITH HUMOGEN AND AZOTOBACTER. 3. GROWN WITH THE BEST MANURE.

RAISING plants by bacteria is the latest achievement of Professor Bottomley, the famous savant of King's college, England. This is not the

ory of the distinguished scientist, but an accomplished fact.

Professor Bottomley evolved his "humogen," or plant food, through the discovery that bacteria in the ground ex-

tract free nitrogen from the air and then feed it to the plant roots in the form of nitrogenous products. Now the problem was to discover a substance as near as possible to pure nitrogen to be fed to the plants by the bacteria. Fertilizer, both artificial and natural, contains nitrogen, but in quantities too small to be used as plant food in the form Professor Bottomley desired.

Peat-moss, a plentiful but hitherto useless substance, is rich with nitrogen, but in its natural form peat-moss is positively poisonous to plants. Treated with certain kinds of bacteria, this peat-moss crumbles up into a black, crumbly stuff sixty times as effective as the best fertilizer. This Professor Bottomley calls "humogen," from the "humus," which is the essential part of soil, and "genesis," meaning life-growth.

Chief among the cultivated bacteria with which the peat-moss is treated are the "azotobacter," the super-bacteria of a beneficent kind. Given a colony of azotobacter and a supply of peat-moss, the English professor claims he can transform hundreds of acres of arid land into a fertility hitherto never approached by any of the "garden spots" of the earth. On the other hand, a hundred pounds of potatoes can be grown in a window box.

Don't KISS the Family CAT

THOSE super-scientific souls who have lately crusaded so vigorously against the practice of kissing have now centered their shafts on the family cat.

And it would seem that they are likely to meet with more success than in their attempts to reform the ways of sweethearts, or even of doting parents and relatives of baby, for it has been proved without a chance of error that Tabby or Pussy is no fit object for osculatory demonstration.

The cat is known as a "clean" animal for its custom of freely using its tongue for ablative purposes. But Professor Flocci, an Italian chemist who made exhaustive laboratory experiments with feline saliva, finds it swarming with minute bacilli not free from danger to human beings. When he inoculated rabbits and guinea pigs with this noxious substance they died within twenty-four hours. A cat's mouth is a hotbed for the propagation of germs and the animal's tongue spreads these bacilli over everything with which it comes in contact. So don't kiss the cat.

ORIGIN of "TRENCH Fever" Is PUZZLE to Medical MEN

THE exact origin of "trench fever," or intermittent pyrexia, has not yet been discovered by the medical men who are caring for the soldiers on the western front. Although all the armies have been seriously affected by trench fever, none has been hit quite so hard as the British and naturally the British medical corps have devoted considerable time to investigation of this disease.

It has been discovered the disease is not caused or transmitted by either bacteria or insect bites. The symptoms are closely related to those of malaria, influenza and dengue, but it has been determined that the malady affecting the soldiers is distinct from all or any of these diseases.

In most of the cases the onset is sudden, characterized by headaches, dizziness and shivering. The chief symptoms are headache and pain in the back and legs. Catarrh is always absent and other indications of influenza are not present, neither is there any rash as would accompany dengue.

Exhaustive laboratory tests determined that the blood of trench fever patients was free from any distinctive bacteria. Although practically all the patients had been bitten by insects, so also had thousands of others that showed no symptoms of trench fever. In all the cases, however, the patients had been exposed to cold and damp from sleeping on wet ground or from rain. The following data is taken from a typical group of thirty patients whose cases were given special attention in the British base hospitals:

In twenty-three cases the onset was sudden, in seven more gradual. In the former case the disease began with headache, dizziness, and shivering; in the latter with headache and general malaise. The chief symptoms were headache and pain in the back and legs. Headache occurred in every case. It was rarely very severe, and in two cases only was it intense; it was usually frontal. Pain in the lumbar region was present in twenty-seven cases, pain in the legs in twenty-six; in no case was it very severe. Pain and stiffness in the neck were very rare. Abdominal pain occurred only in four cases, and was always described as radiating round from the back, and was probably of muscular origin. Dizziness was complained of in the majority of cases, and was an early symptom, but sometimes it persisted for several days. Two patients fainted at the beginning of the illness. Vomiting was rare (four cases only), and was never very persistent; in every case it was associated with, and probably due to, obstinate constipation. Constipation was present in seven cases; diarrhea occurred only once, and then lasted only one day. Dryness of the throat was complained of by two patients, but in neither case was there any redness of the throat.

The most striking feature in the con-

dition of the patients was the absence of any objective signs. There was very little constitutional disturbance, and only three patients looked very ill. The pulse rate was not raised out of proportion to the fever. The tongue was sometimes clean, but more often was slightly furred; in three cases it was thickly coated. There was generally some tenderness over the back and legs, but it was always slight; in four cases there was a little tenderness of the abdominal muscles. The heart and lungs showed no abnormal signs, and bronchitis was always absent. The spleen and liver were not enlarged.

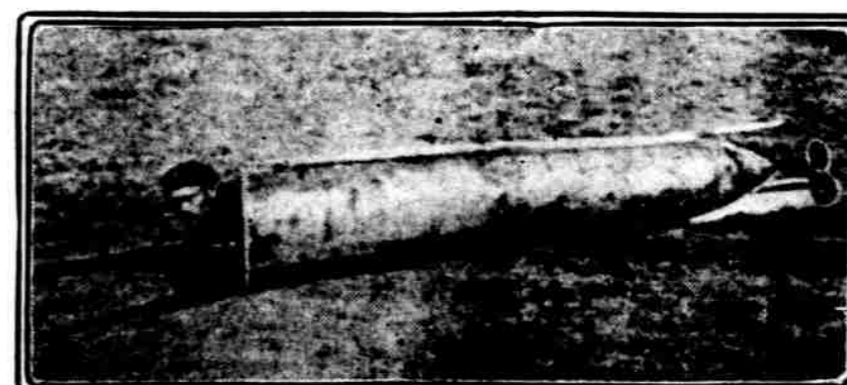
The temperature chart furnishes the most characteristic feature of the disease. The temperature was at first raised, then fell to normal, and this fall was accompanied by one or more relapses. With each relapse there was a recurrence of an aggravation of the symptoms.

Chelan river, in the state of Washington, is only four miles long but has a drop of 380 feet. It forms the outlet of Lake Chelan and Columbia river at Chelan Falls.

Experiments to determine the value of the potash deposits in the desert basins of the west are being carried out by the United States geological survey.

Three mills are now in operation in the Willow Creek gold mine district, Alaska, and more are soon to be installed.

A New French Torpedo Mine



A FRENCH TORPEDO-MINE.

AN adequate conception of the size of the new French torpedo mines may be gained by this picture, which shows a German soldier comfortably resting inside one of the shells which failed to explode, and from which the charge has been drawn. These torpedo mines are of enormous destructiveness. Of course they can not be projected great distances, but they are dangerous weapons in trench warfare. The torpedo shown above was fourteen feet two inches long and one foot eight inches in diameter.